Philosophy 1102

Instructor: Richard Johns

Answers to Problem Set 2

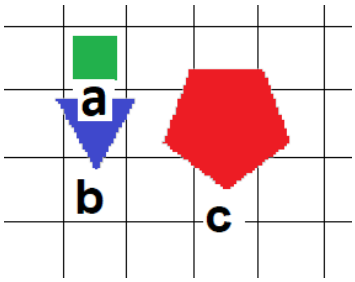
[Total: 50 marks]

1.

(i) It's invalid, as shown by this TT || F world (where the premises are true and the conclusion is false). [4 marks for world]

T Adjoins(a, b)
T SameRow(c, b)
T LeftOf(a, c)

F SameRow(a, c)



(ii) Valid. [4 marks for proof outline]

1. Tet(b) ∨ Cube(c)
2. Tet(a)
3. ¬ SameShape(a, b)

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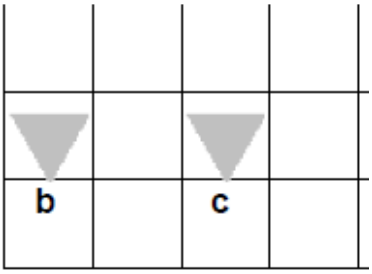
4. ¬Tet(b) (2, 3)
5. Cube(c) (1, 4)
6. ¬Dodec(c) (5)

(iii) [4 marks for world]

T	1. SameSize(b, c)
T	2. Tet(c) ∧ Tet(b)
T	3. SameRow(b, c)
F	4. b = c



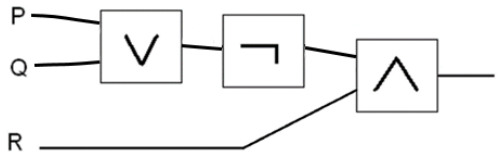
2. Here's a formal proof.
[5 marks for the proof]

1	RightOf(a, c)	
2	a = b	
3	d = c	
4	RightOf(b, c)	= Elim: 1,2
5	d = d	= Intro
6	c = d	= Elim: 3,5
7	RightOf(b, d)	= Elim: 4,6

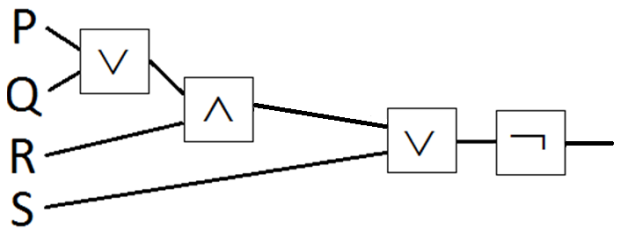
3. [2 marks each]

(i) $\neg(P \wedge Q)$	Negation sentence
(ii) $\neg P \vee Q$	Disjunction sentence
(iii) $(\neg P \wedge Q) \vee R$	Disjunction sentence
(iv) $(P \wedge Q) \wedge \neg(R \vee S)$	Conjunction sentence

(v) Conjunction sentence



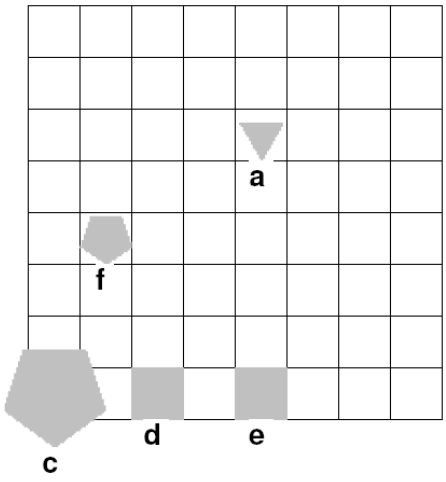
(vi) Negation sentence



4. [1 mark for each truth value -- total 10 marks]

F	1. $d \neq e$
T	2. Dodec(c) $\vee$ Dodec(a)
T	3. Cube(d) $\wedge$ Cube(e)
F	4. $\neg$(Cube(d) $\wedge$ Cube(f))
F	5. $\neg$(Cube(a) $\vee$ Cube(f))
T	6. $\neg$(Small(a) $\wedge$ $\neg$Small(f))
T	7. Dodec(f) $\vee$ $\neg$Medium(a) $\vee$ Tet(e)
T	8. $\neg$(Large(c) $\wedge$ $\neg$Medium(a)) $\vee$ $\neg$ $\neg$Small(f)
T	9. (SameSize(a, f) $\vee$ SameSize(d, e) $\vee$ Larger(c, f)) $\wedge$ $\neg$Larger(f, a)
T	10. $\neg$ $\neg$ $\neg$ $\neg$Medium(d)

5. Here's one such world. [5 marks for world]



Notes:

1. To make #1 true you have to make **d and e non-identical**.

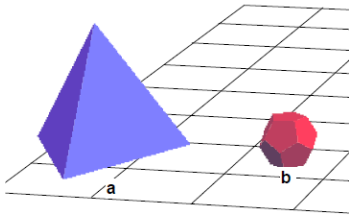
2. Since d remains a cube (by #3) then **f cannot be a cube**, to make #4 true. (f can be a dodec or a tet.)

3. Other worlds are possible, but they require more changes to the original.

6.

(i) [3 marks for world]

(Note: b cannot be large. The size of a is irrelevant.)

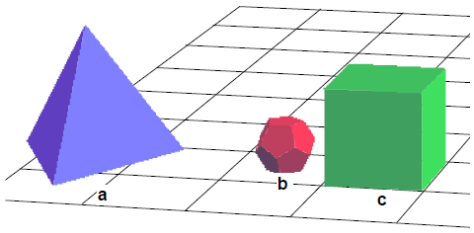


T | $\neg(\text{Large}(a) \wedge \text{Large}(b))$

F | $\neg\text{Large}(a) \wedge \text{Large}(b)$

(ii) [3 marks for world]

(Note: a must be a tet, and c must **not** be a tet. The shape of b is irrelevant.)



T | $\text{Tet}(a) \vee (\text{Tet}(b) \wedge \text{Tet}(c))$

F | $(\text{Tet}(a) \vee \text{Tet}(b)) \wedge \text{Tet}(c)$